

CLAIMS

What is claimed is:

1. An integrated circuit on a line card in a router, the line card having a first interface through which the line card is couplable to either a cell network or a packet network, the line card having a second interface through which the line card is coupled to a switch fabric of the router, the integrated circuit being configurable:

in a first way such that the line card receives data in cell format from the cell network via the first interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the second interface to the switch fabric;

in a second way such that the line card receives data in packet format from the packet network via the first interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the second interface to the switch fabric;

in a third way such that the line card receives data in cell format via the second interface, the data passes through the integrated circuit, and the line card outputs said data in cell format via the first interface to the cell network; and

in a fourth way such that the line card receives data in cell format via the second interface, the data passes through the integrated circuit, and the line card outputs said data in packet format via the first interface to the packet network.

2. The integrated circuit of Claim 1, wherein the data in the cell format represents first data contained within cells of a fixed size when the first data belongs to a first flow, and wherein the data in the packet format represents second data contained in variable size packets when the second data belongs to a second flow.

3. The integrated circuit of Claim 1, wherein the router is one of an ATM switch that redirects ATM cells from one network to another network.

4. The integrated circuit of Claim 1, wherein the router is an IP router that redirects IP packets from one network to another network.

5. The integrated circuit of Claim 1, wherein both a first flow of cell format data and a second flow of packet format data are received onto the line card via one wavelength band in a fiber optic cable, the integrated circuit being configured in the first way so the first flow of cell format data passes through the integrated circuit and to the switch fabric, the integrated circuit being configured in the second way so that the second flow of packet format data passes through the integrated circuit and to the switch fabric.

6. An integrated circuit on a line card in a router, the line card having a first interface through which the line card is couplable to either a cell network or a packet network, the line card having a second interface through which the line card is coupled to a switch fabric of the router, the integrated circuit being configurable:

1 in a first way such that the line card receives data in cell format from the cell
2 network via the first interface, the data passes through the integrated circuit, and the
3 line card outputs said data in cell format via the second interface to the switch fabric;
4 and

5 in a second way such that the line card receives data in packet format from the
6 packet network via the first interface, the data passes through the integrated circuit,
7 and the line card outputs said data in cell format via the second interface to the switch
8 fabric.
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10 7. An integrated circuit on a line card in a router, the line card having a first interface
11 through which the line card is couplable to either a cell network or a packet network,
12 the line card having a second interface through which the line card is coupled to a
13 switch fabric of the router, the integrated circuit being configurable:

14 in a first way such that the line card receives data in cell format via the second
15 interface, the data passes through the integrated circuit, and the line card outputs said
16 data in cell format via the first interface to the cell network; and

17 in a second way such that the line card receives data in cell format via the second
18 interface, the data passes through the integrated circuit, and the line card outputs said
19 data in packet format via the first interface to the packet network.
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21 8. An integrated circuit on a line card in a router, the line card having a first interface
22 through which the line card is couplable to either a cell network or a packet network,
23 the line card having a second interface through which the line card is coupled to a
24 switch fabric of the router, the integrated circuit being configurable:

25 in a first way such that the line card receives data in cell format from the cell
26 network via the first interface, the data passes through the integrated circuit, and the
27 line card outputs said data in packet format via the second interface to the switch
28 fabric;

29 in a second way such that the line card receives data in packet format from the
30 packet network via the first interface, the data passes through the integrated circuit,
31 and the line card outputs said data in packet format via the second interface to the
32 switch fabric;

33 in a third way such that the line card receives data in packet format via the second
34 interface, the data passes through the integrated circuit, and the line card outputs said
35 data in cell format via the first interface to the cell network; and

36 in a fourth way such that the line card receives data in packet format via the
37 second interface, the data passes through the integrated circuit, and the line card
38 outputs said data in packet format via the first interface to the packet network.
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40 9. An integrated circuit on a line card in a router, the line card having a first interface
41 through which the line card is couplable to either a cell network or a packet network,
42 the line card having a second interface through which the line card is coupled to a
43 switch fabric of the router, the integrated circuit being configurable:

44 in a first way such that the line card receives data in cell format from the cell
45 network via the first interface, the data passes through the integrated circuit, and the

1 line card outputs said data in packet format via the second interface to the switch
2 fabric; and

3 in a second way such that the line card receives data in packet format from the
4 packet network via the first interface, the data passes through the integrated circuit,
5 and the line card outputs said data in packet format via the second interface to the
6 switch fabric.

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8 10. An integrated circuit on a line card in a router, the line card having a first
9 interface through which the line card is couplable to either a cell network or a packet
10 network, the line card having a second interface through which the line card is
11 coupled to a switch fabric of the router, the integrated circuit being configurable:

12 in a first way such that the line card receives data in packet format via the second
13 interface, the data passes through the integrated circuit, and the line card outputs said
14 data in cell format via the first interface to the cell network; and

15 in a second way such that the line card receives data in packet format via the
16 second interface, the data passes through the integrated circuit, and the line card
17 outputs said data in packet format via the first interface to the packet network.

18
19 11. An integrated circuit on a line card in a router, the integrated circuit comprising a
20 lookup engine, a segmentation engine, and a reassembly engine, the lookup engine
21 being usable to analyze a flow of incoming network information and to output an
22 identifying flow number therefore, the segmentation engine being usable to segment a
23 large block of data into a plurality of smaller blocks of data, the segmentation engine
24 temporarily storing the smaller blocks of data, the reassembly engine being usable to
25 reassemble a plurality of smaller blocks of data into a larger block of data, wherein
26 the integrated circuit is configurable:

27 in a first configuration as an ingress integrated circuit to receive data in cell
28 format and to output to a switch fabric of the router said data in packet format;

29 in a second configuration as an ingress integrated circuit to receive data in packet
30 format and to output to the switch fabric of the router said data in packet format;

31 in a third configuration as an egress integrated circuit to receive data in packet
32 format from the switch fabric of the router and to output to a cell network said data in
33 cell format; and

34 in a fourth configuration as an egress integrated circuit to receive data in packet
35 format from the switch fabric of the router and to output to a packet network said data
36 in packet format.

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38 12. The integrated circuit of Claim 11, wherein the lookup engine operates to output
39 flow numbers in the first configuration and the second configuration but does not
40 output flow numbers in the third configuration and the fourth configuration.

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42 13. The integrated circuit of Claim 11, wherein the segmentation engine operates to
43 segment a large block of data into a plurality of smaller blocks of data second
44 configuration, the third configuration, and the fourth configuration, the segmentation
45 engine not segmenting a large block of data into a plurality of smaller blocks in the
46 first configuration.

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2 14. The integrated circuit of Claim 11, wherein the reassembly engine operates to
3 reassemble a plurality of smaller blocks of data into a larger block of data in the first
4 configuration, the second configuration, and the fourth configuration, the reassembly
5 engine not reassembling a plurality of smaller blocks of data into a large block of data
6 in the third configuration.

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8 15. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
9 identifying flow numbers for ATM flows.

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11 16. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
12 identifying flow numbers for MPLS flows.

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14 17. The integrated circuit of Claim 11, wherein the lookup engine is usable to output
15 identifying flow numbers for frame relay flows.

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17 18. The integrated circuit of Claim 11, wherein the integrated circuit has a first
18 interface through which the integrated circuit is coupled to a network, the first
19 interface having a plurality of logical ports such that each flow is received onto or is
20 transmitted from the integrated circuit via one and only one port, the flows on each
21 port being of only one service type.

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23 19. The integrated circuit of Claim 18, wherein the lookup engine being usable to
24 analyze flows of incoming network information by identifying a port for a flow and
25 then based on the port identified looking up the service type of the flow.

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27 20. The integrated circuit of Claim 11, wherein the each of the smaller blocks of data
28 generated by the segmentation engine is temporarily stored in a memory and wherein
29 a pointer is generated for each smaller block of data that identifies where in the
30 memory the smaller block of data is located, and wherein the reassembly engine does
31 not read the smaller blocks of data out of the memory and reassemble them and then
32 store them in reassembled format prior to the smaller blocks being output from the
33 integrated circuit but rather the smaller blocks of data are output from the integrated
34 circuit smaller block by smaller block, the pointers being used to identify where in
35 memory each smaller block being output is located.

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37 21. The integrated circuit of Claim 1, wherein the integrated circuit further comprises
38 a per flow queue, a scheduler, and a memory manager.
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